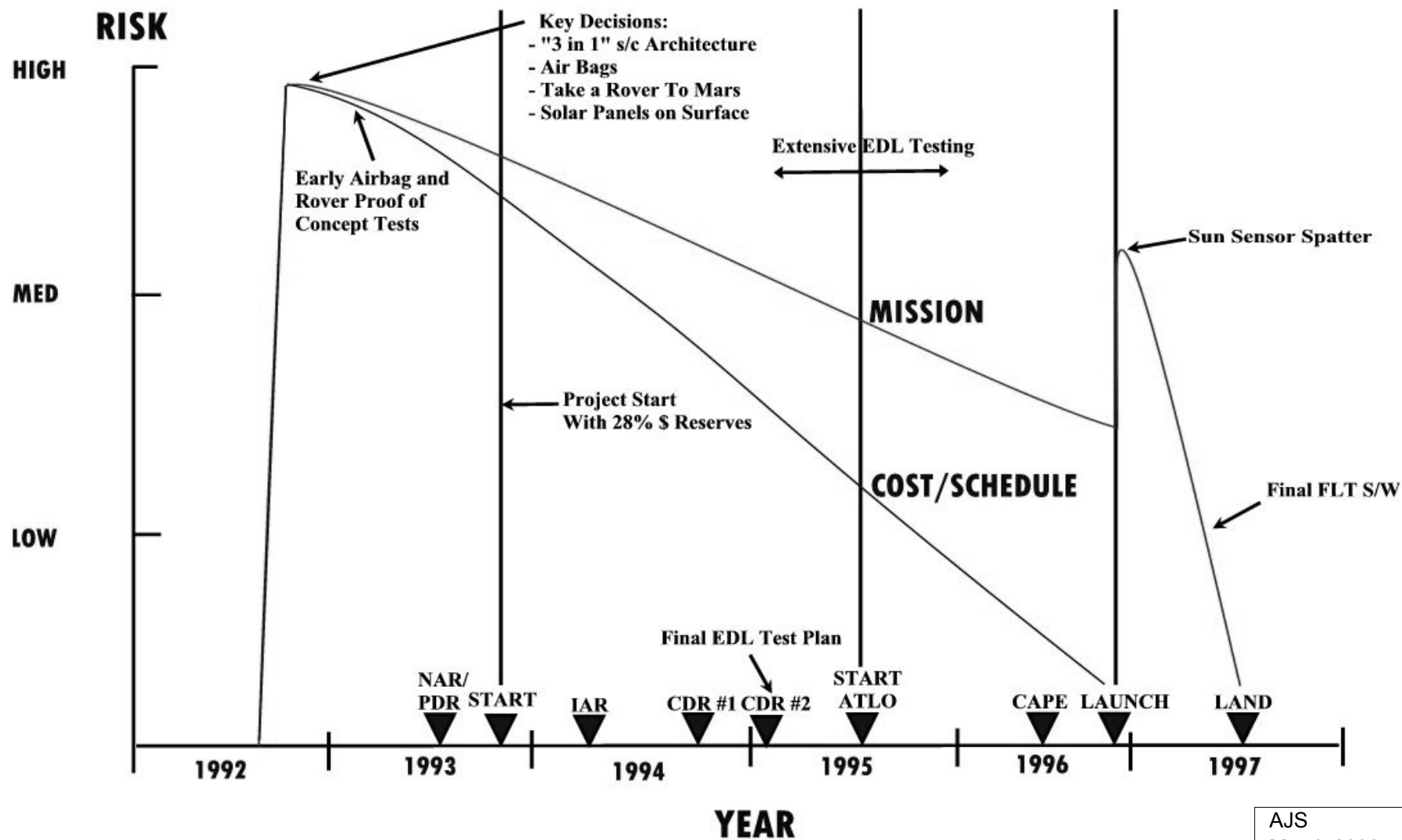


Example

MARS PATHFINDER RISK SIGNATURE SCHEDULE/COST AND MISSION RISK





NASA FBC TASK

INFO AGE →		
Old NASA	NASA In Transition	New NASA
80's	90's	New Millennium

FBC Rule of Engagement for Institutions

- Institutionalizing FBC is the hard next step we are currently facing, but where major strides can be made to take FBC “up a notch” to the next level.
- It must start with people. NASA needs an infusion of leaders at NASA HQ and within the Centers – a method to incentivize leaders to join NASA’s ranks. NASA must also start with the universities to motivate young talent to join NASA – and sufficient resources need to be made available to hire young people. More open engagement of universities in research and advanced technology development and in university-managed Space Projects must be given higher priority – with more NASA assistance and mentoring to make them work.
- Presently, there is some, but too little open exchange and debate of ideas within NASA HQ and between HQ and the Centers. An outstanding example of the type of “blue sky thinking” that should be popping up all over the place, even at HQ, is the study “Grand Challenges for Space Exploration”, Space Times, May-June 1999, that Wes Huntress accomplished prior to his retirement. The Mars Colonization Study Carrier out by Doug Cook and Norm Haynes has brought JSC and JPL closer together than ever before. Such activities must continue under careful guidance by NASA HQ across all Centers. The Decadal Study may also be a good example of good HQ and Center teaming, but it should be placed on the internet for wider participation by the NASA community.



NASA FBC TASK

INFO AGE →		
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FBC Rules of Engagement for Institutions - *continued*

- ✓ Make acquisition of, sustaining, motivating key personnel a major priority
 - ✓ Start by placing more emphasis on engaging universities in research and advanced technology development and university-managed space missions
 - ✓ Put a premium on people, they are the reason for FBC successes
 - ✓ Create an environment which promotes personal and team initiative and creativity
 - ✓ Trust and empower people, listen to their feedback
 - ✓ Move from adversarial/formal to open relationships, where issues are openly and candidly debated, where people can express themselves without fear
 - ✓ Breakdown organizational barriers to progress, especially for NASA HQ and Center teaming
 - ✓ Recognize outstanding work with significant rewards
 - ✓ Do not overreact to problems, but incorporate lessons learned effectively
 - ✓ Align NASA HQ and Centers to:
 - Identify, apportion, and then maintain core competency throughout the Centers - Important
 - Accomplish an Integrated Information Technology thrust- Important
 - Accomplish an Integrated Advanced Technology thrust - Important

Continually evaluate the effectiveness of policies, rules, procedures, processes, evolving them to be consistent with the dynamic environment, eliminating those that are no longer relevant



NASA FBC TASK

INFO AGE →		
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FBC Rules of Engagement for Institutions – *continued*

- As with acquiring and maintaining good people, settling the NASA Center core competency problem is a major priority. This must occur before major strides are made in affecting Center-to-Center teaming on such important thrusts such as linking NASA into one information exchange and accomplishing a much more robust advanced technology initiative – both important for the future of FBC.
- Each Center must have a well-defined role which is respected and supported by the other centers. Lead Centers then have the responsibility of leading other involved Centers in development of effective Center-to-Center Implementation Plans and Teams. NASA Centers must continue to have an “in house” technology and project management experience base. There must be a balance between competition of technology and maintaining stable, important core competencies within the Centers that are constantly checked to ensure world class status. Mission Centers must maintain an “in house” capability at world class, in key technical areas necessary for Mission implementation-at least from mid to high TRL levels.
- NASA HQ, especially the enterprises, must be involved in and supportive of resolution of the Center core competency problem- buying into and supporting the final resolutions
- We need to educate the public more clearly on the challenge and risk as well as the exciting, potential return on their space exploration investment.



NASA FBC TASK

INFO AGE →		
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FBC Rules of Engagement for Institutions – *continued*

- Support smaller core Project Teams with multi-mission pools of technical/management expertise, advanced technology, best tools, training, processes, standards, lessons learned databases, effective checks and balances
 - ✓ **Resist temptation to over-review, be sensitive to not stifling initiative and productivity**
 - ✓ **Electronically wire NASA with advanced IT technology so that all Centers become one information exchange**
 - ✓ **Obtain incentives for the incorporation of advanced technology in Flight Projects**
 - ✓ **Standardize to extent possible across NASA**
- Conduct frequent symposiums to share experiences and lessons learned, new ideas – bring in outsiders
- Develop a realistic approach, with proper incentives, encouraging the mobility of both technical and management people within NASA
- Incentivize inter-Enterprise and inter-Center Teaming, especially in Information Technology to:
 - ✓ **Enforce lead Center roles**
 - ✓ **Get NASA HQ Managers and Center's Directors to buy into teaming with clear and "committed to" plans and measurable deliveries**
 - ✓ **Make Enterprise and Center yearly performance evaluations dependent on their teaming initiatives**
 - ✓ **Have annual enterprise and Center performance reviews include their support of Teaming**

Also Reach Out to the Public

IT = Information Technology



NASA FBC TASK

INFO AGE →		
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FBC Rules of Engagement for Institutions – *continued*

- Programs provide a major opportunity to build upon individual Missions to accomplish larger, Program objectives, to infuse advanced technology into a sequence of Projects, to exploit cost effective use of multi-mission equipment, and to gain the efficiencies of multi-buys, and combined teams. However, as with the individual Projects, significant up-front Program planning is necessary including Program architectural system engineering, i.e. system engineering over the set to Missions to ensure that each Mission adequately supports the next Mission. This up-front Program planning and engineering is challenging, especially in establishing a well-scoped, budgeted and planned set of Missions that fit the Program funding profile.
- There is an important give-and-take/ Program vs. Project negotiation that must be in place for all Projects within the Program. Each Project must stand alone, be empowered and be accountable to meet its Mission Objectives, but at the same time be motivated, incentivized, to wear the bigger “Program Hat,” to implement program unique requirements such as use of multi-mission technology and to accept program unique engineering and science requirements.



NASA FBC TASK

INFO AGE →		
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Rules of Engagement for Institutions – *continued*

- Place more emphasis on thorough and realistic program planning
 - ✓ Conduct Independent reviews of Program Plans as well as the individual Project Plans
 - ✓ Conduct careful Program system engineering across the set of Missions to insure that the projects collectively achieve Program objectives
 - Establish and maintain a Program programmatic and Mission set risk signature, as with the Projects
 - ✓ Resist placing too many Projects under the Program funding profile
 - ✓ Place higher priority on thorough and realistic Project planning within the Program
 - Establish “bottoms up” Project budgets, including reserves, developed by and “owned” by the Project Teams, and Project Plans that meet both the individual Project as well as Program unique requirements
 - Establish well understood Project requirements prior to Project start
 - Maintain Project requirement stability throughout development
 - Fund Projects according to their required funding profile including reserves



NASA FBC TASK

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Rules of Engagement for FBC Technology Development

- Infusion of advanced technology is of major importance to the future of FBC and must receive higher priority and funding. NASA must avoid a shift of technology funding from research and advanced technology to focused technology development to meet immediate Mission Objectives – “eating the seed corn.”
- **Is this the proper technology strategy for NASA?**
Does NASA then rely on other government agencies, industry and academia to provide this research and advanced technology component? Has this strategy been adequately studied and debated?
- The issues associated with “Center core competency” and “competition of advanced technology” also bear on this research and advanced technology issue. All three must be dealt with together to effect an integrated solution. This is the major NASA problem which must be solved for the future of FBC.



NASA FBC TASK

INFO AGE →		
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Rules of Engagement for FBC Technology Development

- Maintain a culture of innovation
- Stimulate and reward “Out Of The Box” and entrepreneurial thinking
- Provide long-term funding stability for a balanced research and advanced technology and focused technology development Program
- Ensure sufficient level of technical management and reporting
- Encourage Peer Reviews, and external Peer-Reviewed publications
- Encourage partnerships with academia, other government agencies, national laboratories, and industry
- Set the technology development priorities based on NASA strategic goals and vision. Help define the future NASA vision which then drives both research and advanced technology development as well as focused technology development
- Set a world-class standard of excellence with peers and scientists
- Establish a balance between research, advanced development, and focus technology development. Also establish a correct balance between competed and stable in-house technology development. Accomplish early incremental, prototyping and technology demonstrations throughout the technology development cycle
- Initiate early up-front planning with project team members for technology infusion into flight projects
- Accomplish technology transfer to industry
- Manage technology development throughout the complete life-cycle, from concepts to technology infusion, with appropriate level budget and schedule plans

“Be on the look out” for technologies high payoff to society, and suggest them for major NASA and other government initiatives, that is, “Mini-Manhattan” like Projects with open communication and exchange and Peer-Review.”

AJS
March 2000
14b



NASA FBC TASK

INFO AGE →		
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Technology Perspective for FBC

- Infusion of advanced technology into Project development is accomplished – as with any successful human endeavor – by early and thorough communication between the technology and Project groups. Involvement of Project people early to gain their ownership is essential. A good example of this type of process, initiated at JPL, is modification of their TEAM X, Pre-Project design and planning activity to include advanced technology insertion at this stage of Project planning – calling it TEAM XT.
- All government agencies in advanced technology development must be on the lookout for technologies that have the potential for high payoff for space exploration and for the nation in general. Yearly “Out-of-the-Box” workshops that flag potentially, high payoff technologies for accelerated development by the government in “Mini-Manhattan” like Projects should be conducted throughout with government, industry and university participation – with prizes given to the winners of the best ideas.